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June 26, 1986

DIVISION OF
OIL, GAS & MINING

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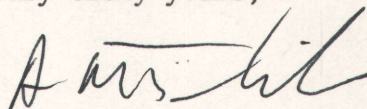
Mr. D. Wayne Hedberg
Division of Oil, Gas & Mining
Utah Department of Natural Resources
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180

Dear Wayne:

SUBJECT: Utah Copper Division Modernization Project

Enclosed for your review and approval is our proposed Revegetation Test Study Program, as required by DOGM's Phase I approval of the Utah Copper Division Modernization Project. Please contact me if you would like to discuss the program details.

Very truly yours,



A. M. Trbovich
Chief Air Resource Engineer

AMT:mf
Enclosures

cc: G. H. Boyce, w/enc.
S. D. Taylor, w/enc.

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REVEGETATION TEST STUDY PROGRAM

UTAH COPPER DIVISION MODERNIZATION PROJECT

Background

On March 27, 1986, the Utah Division of Oil, Gas and Mining (DOGM) approved "Phase I" of Kennecott's Mining and Reclamation Plan Amendment. The plan amendment was made necessary by Kennecott's decision to construct new ore processing facilities on property not currently included in the existing DOGM permit. "Phase I" included site grading and access road construction of the grinding plant site near Copperton.

As part of the site preparation plan, Kennecott decided not to store "A" horizon soil for reclamation at the end of the plant life. Kennecott concluded that "A" horizon soil is only marginally higher quality than "B" horizon soil, making the cost of stripping and storing the "A" material unjustifiable. While not agreeing with Kennecott regarding soil quality, DOGM did agree not to require soil storage for final reclamation. DOGM did stipulate that a revegetation test plot study be developed and implemented to determine the relative ability of the various soils on site to support an adequate vegetation cover. The test program described in this document addresses DOGM's concerns and meets the stipulated requirements.

Plot Study

The plot study is designed to test three different soil types and three different soil conditions. The three soil types to be tested are 100% "A" horizon soil, 100% "B" horizon soil and a mixture of 50% "A" and 50% "B". The three soil conditions to be tested are noncompacted (normal) soil, compacted soil and compacted anaerobic soil. The two variables to be examined are the effect of tilling versus ripping only and the effect of added organic matter versus no added organic matter.

Several factors will not be varied from plot to plot. The final reclamation seed mixture (Table 1) will be used uniformly and will be fertilized uniformly. Mulch will be added to all plots by planting rapidly germinating barley through the entire study area. All legumes will be inoculated with nitrogen fixing microbes. The described practices are a standard portion of Kennecott's ongoing reclamation program and will be included in any final reclamation plan.

A schematic drawing of the study area is given in Figure 1. Each subplot is 20 feet by 30 feet, making a total study area of 64,800 square feet (1.49 acres). Each subplot is repeated in three nonadjacent areas to make statistical comparisons possible. The entire study area will be fenced to restrict wildlife access. The location of the study area is shown in Figure 2.

The test plots will be evaluated on the basis of percent cover and species frequency. Evaluations will be performed three times per year in the spring (April, May), summer (July) and fall (September, October). Evaluations will begin in the year following planting of the test plots. An undisturbed area of natural vegetation near the test plots will also be evaluated for comparative purposes.

Individual Species Study

In order to evaluate the appropriateness of the individual species selected for the final reclamation seed mixture, a minimum of three rows of each specie will be planted. The rows will be adjacent to the plot study area and will be 20 feet long. Consideration will be given to eliminating from the final seed mixture species which do not perform well.

Schedule

The compacted soil and anaerobic compacted soil areas will be prepared in the fall of 1986. The anaerobic compacted soil will be prepared by paving with asphalt previously compacted soil. The asphalt will remain in place for five years. In the fall of 1991, the asphalt will be removed, and final preparation and planting of all subplots will be performed. Evaluation will begin the following year (1992) and will continue for three years.

In the individual species study will be planted in the fall of 1986. Evaluation will begin in 1967 and will continue for at least three years.

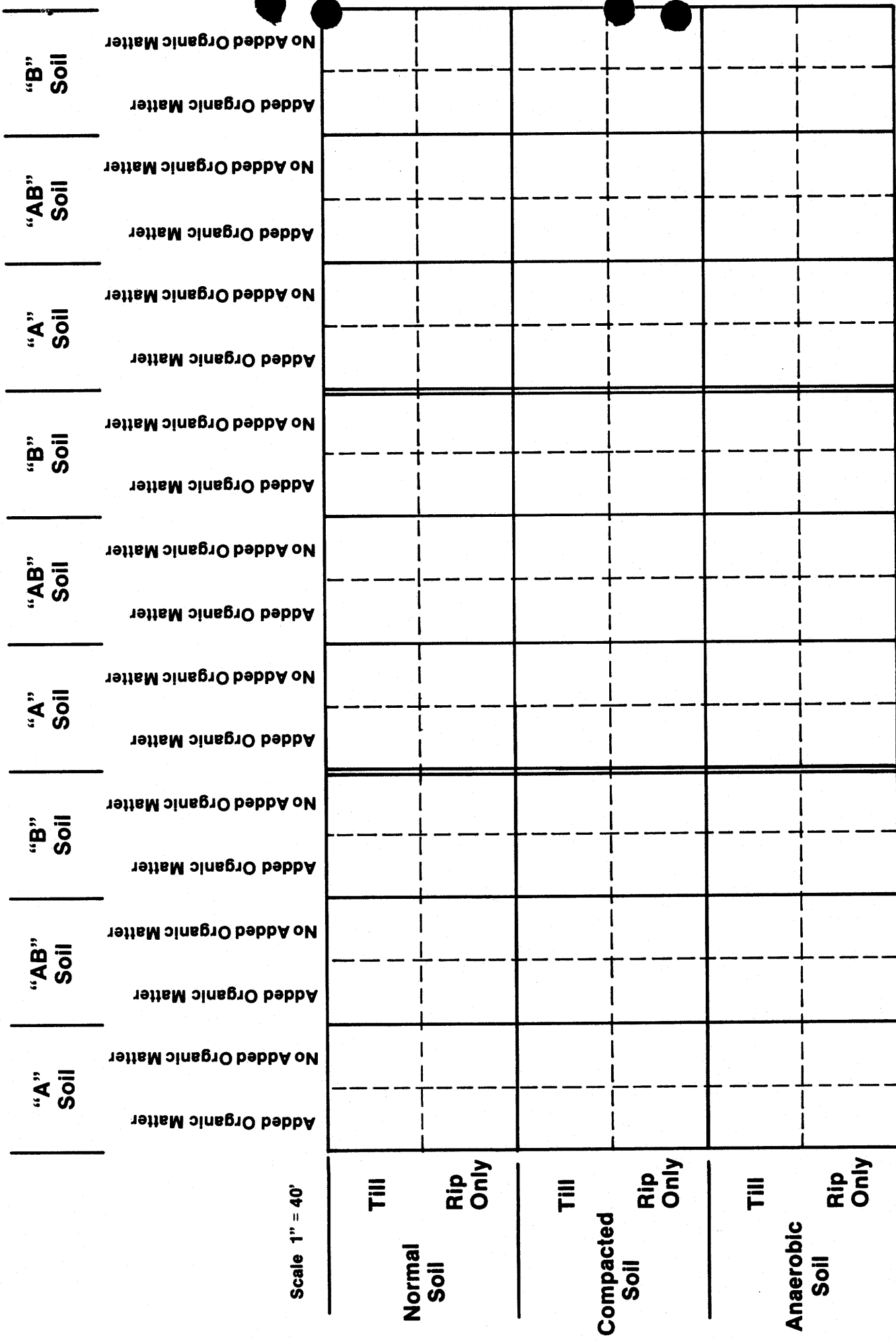
TABLE 1

SEED MIX FOR REVEGETATION TEST STUDY PROGRAM

Species	Rate* (lbs./acre)
<u>Grasses</u>	
<u>Agropyron dasystachyum</u> (thickspike wheatgrass)	2.0
<u>Agropyron intermedium</u> (intermediate wheatgrass)	2.0
<u>Agropyron smithii</u> (western wheatgrass)	2.0
<u>Agropyron trachycaulum</u> (slender wheatgrass)	1.5
<u>Elymus cinereus</u> (Great Basin wildrye)	2.0
<u>Oryzopsis hymenoides</u> (indian ricegrass)	1.0
<u>Forbs</u>	
<u>Achillea millefolium</u> (yarrow)	.1
<u>Aster Chilensis</u> (Pacific aster)	.1
<u>Helianthus annuus</u> (sunflower)	1.0
<u>Linum lewisii</u> (Lewis flax)	.5
<u>Medicago sativa</u> ('Ranger' alfalfa)	1.0
<u>Melilotus officinalis</u> (yellow sweetclover)	1.0
<u>Penstemon strictus</u> (Rocky Mountain penstemon)	.2
<u>Shrubs</u>	
<u>Amelanchier alnifolia</u> (serviceberry)	2.0
<u>Artemisia tridentate</u> ssp. vaseyana ('Hobble Cr.' mountain big sagebrush)	.1
<u>Cercocarpus montanus</u> (true-leaf mtn. mahogany)	2.0
<u>Chrysothamnus nauseosus</u> (rubber rabbitbrush)	.5

Total Seed

*Rate is in terms of Pure Live Seed (PLS) for drill seeding only.



**UTAH GRINDING PLANT RECLAMATION PROJECT
VEGETATION TEST PLOT PLAN**

